RP043

MODELING LANDSCAPE CHANGE IN THE MISSOURI OZARKS IN RESPONSE TO ALTERNATIVE MANAGEMENT PRACTICES

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Abstract—Management of Central Hardwood forest ecosystems requires an understanding of how forest landscapes will change under alternative management practices. We calibrated a landscape simulation model, LANDIS, for the Missouri Ozarks and used it to predict changes in forest size structure and species composition that will result from even-aged harvesting, uneven-aged harvesting, and no-harvest management. We simulated forest vegetation response to harvest, fire, and wind disturbance for mapped landscapes ranging from 800 to 25,000 ha in extent in the heavily forested Missouri Ozarks. The most extensive simulations were for a 842-ha mature forest landscape that was inventoried as part of the Missouri Ozark Forest Ecosystem Project.

We simulated three disturbance regimes that differed in the type and intensity of harvest. The first regime simulated even-aged management by clearcutting. Ten percent of the area was harvested each decade with oldest stands harvested first. The second disturbance regime simulated uneven-aged management by group selection. Group openings were created on 5 percent of the area of each stand in each decade. Opening size ranged from 0.1 to 0.3 ha. The third disturbance regime had no harvesting. All three regimes included simulated fire disturbance with a 300-year mean return interval (similar to fire disturbance under current levels of active wildfire suppression) and simulated wind disturbance with an 800-year mean return interval.

Required input maps for the simulation included the initial species and age class of the forest vegetation (derived from an current inventory information), ecological land types, and stand boundaries. Output maps by decade included forest age structure, species composition, type and location of harvest, intensity and location of fire, and intensity and location of wind disturbance. These maps graphically illustrate anticipated changes in forest age structure and species composition through time across the landscape. This information can be used to derive additional maps of forest type and size class (seedling, sapling, pole, and sawlog). Maps of simulated landscape change under alternative management scenarios provide opportunities to view and discuss the spatial implications of management decisions. The digital landscape maps can be further analyzed with a geographical information system to summarize landscape features such as change in forest size distribution through time, patch size, amount and type of forest edge, or other features associated with wildlife habitat quality (figures 1 and 2).

More complicated harvest patterns can be simulated by subdividing any landscape into management areas that each receive a different harvest regime. Although this simulation system will not predict the exact location of future harvest, wind, and fire disturbance events, it predicts expected large-scale vegetation patterns that result from alternative management and disturbance regimes.

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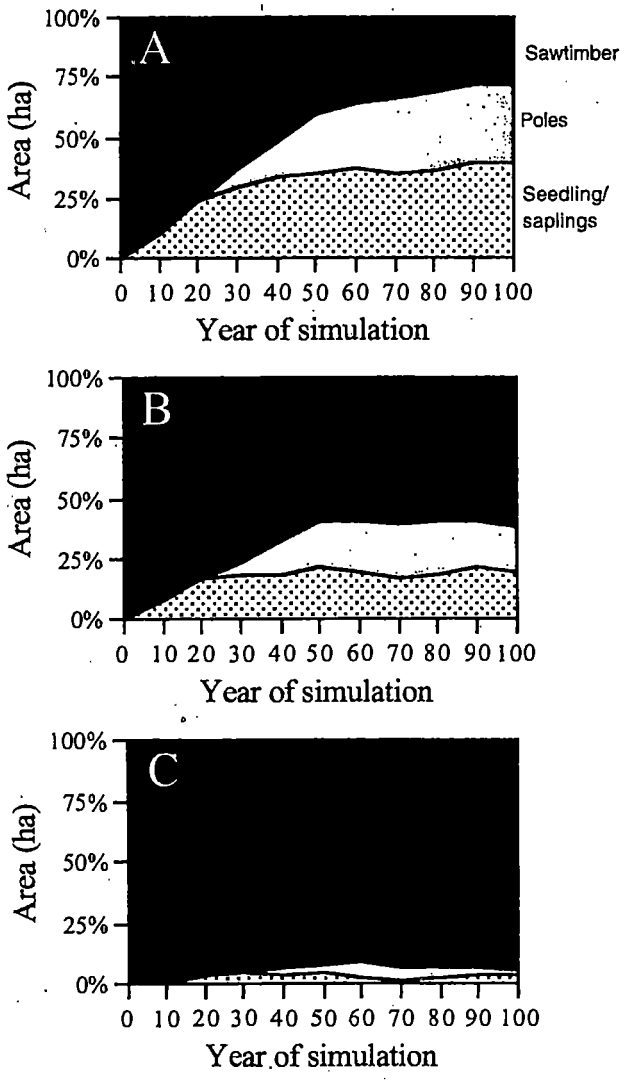

Figure 1—Area by size class over time on an 842-ha upland oak-hickory forest in the Missouri Ozarks under three simulated disturbance regimes: (A) even-aged management; (B) uneven-aged management; (C) no harvest.

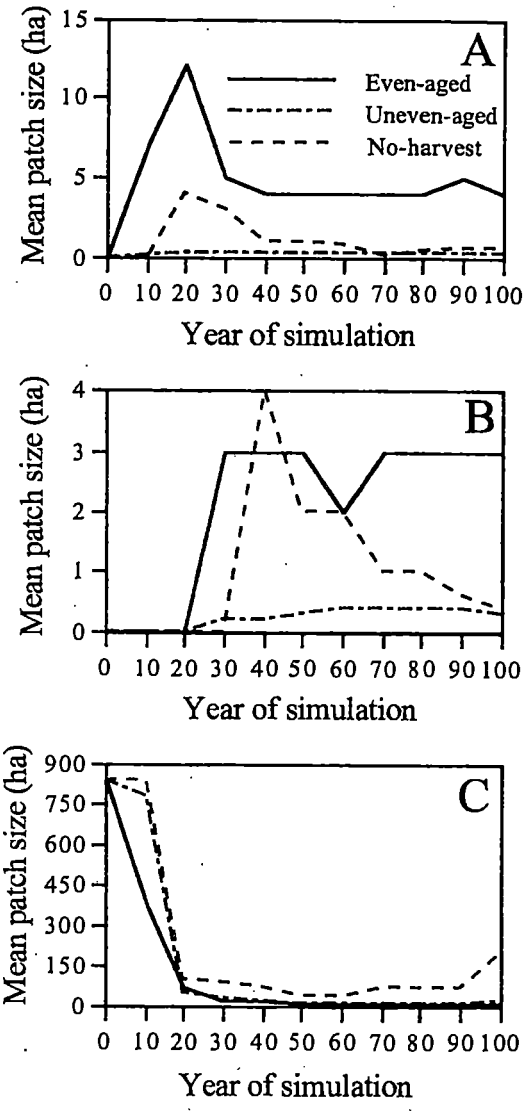

Figure 2—Mean patch size over time for three simulated disturbance regimes applied to an 842-ha upland oak-hickory forest in the Missouri Ozarks: (A) seedling/saplings; (B); pole timber; (C) sawtimber.

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